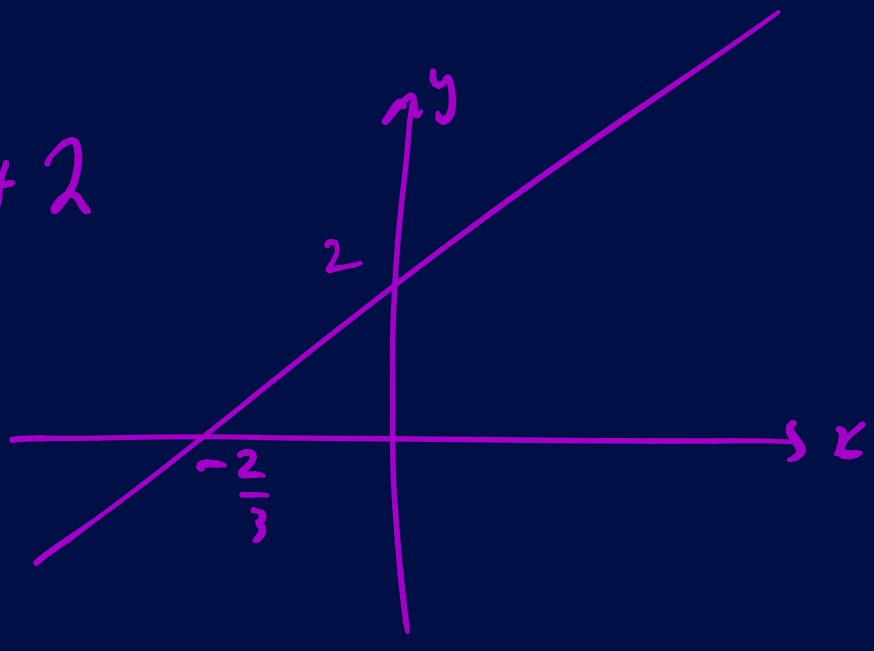
Linear Equations

① $y = 3x + 2$



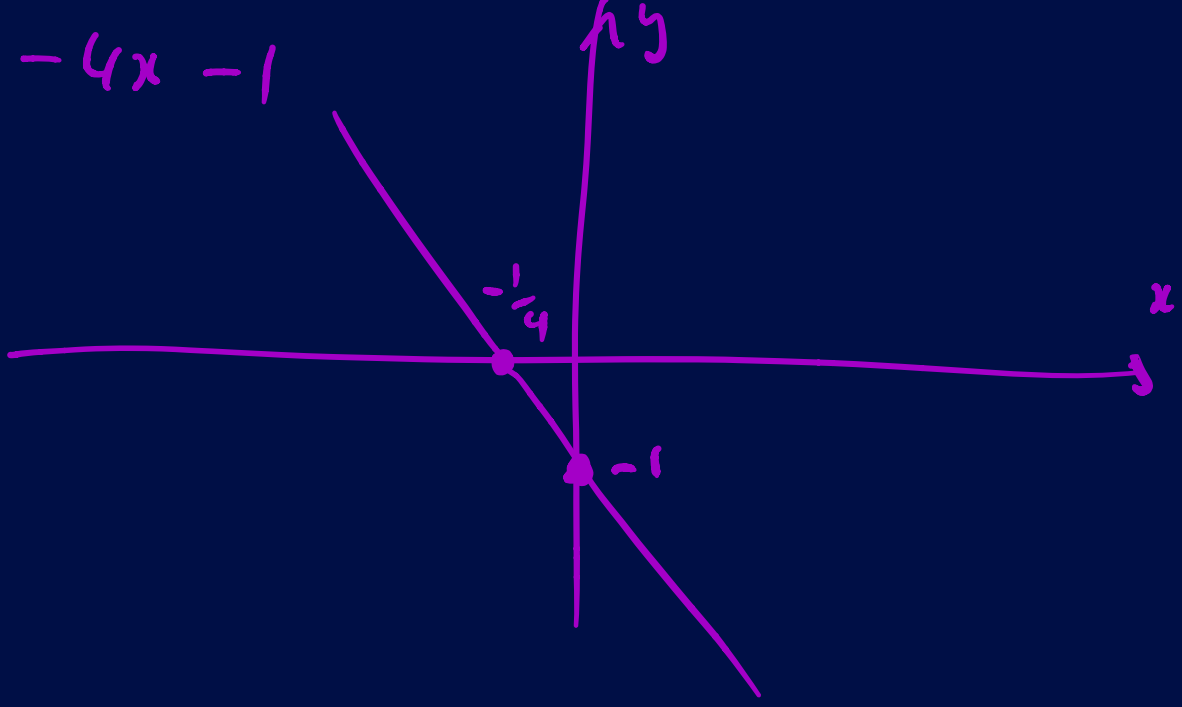
When $x = 0$, $y = 2$

$y = 0$, $0 = 3x + 2$

$\Rightarrow -2 = 3x$

$\Rightarrow x = -2/3$

② $y = -4x - 1$



When $x = 0$, $y = -1$

When $y = 0$, $-4x - 1 = 0$

$\Rightarrow 4x = -1$

$\Rightarrow x = -1/4$

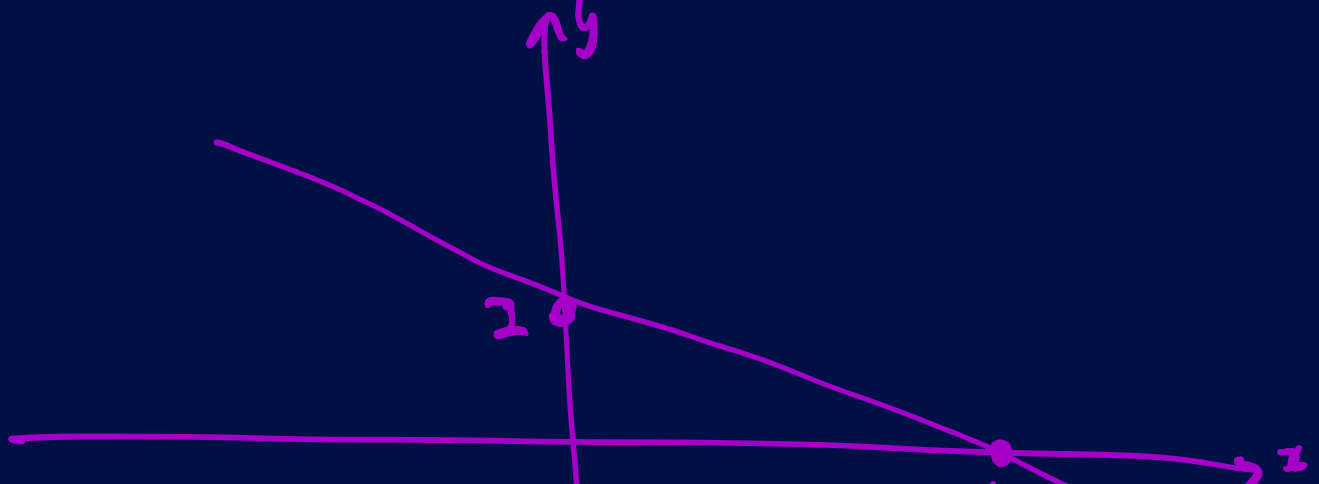
(3) $x + 2y - 4 = 0$

When $x = 0$, $2y - 4 = 0$

$\Rightarrow 2y = 4$

$\Rightarrow y = 2$

When $y = 0$, $x - 4 = 0 \Rightarrow x = 4$



Alternate approach: put into standard form

$$2y = -x + 4$$

$$\Rightarrow y = -\frac{1}{2}x + 2$$

(4) $3x - 2y + 5 = -x + 7$

Rearrange: $4x - 2y - 2 = 0$

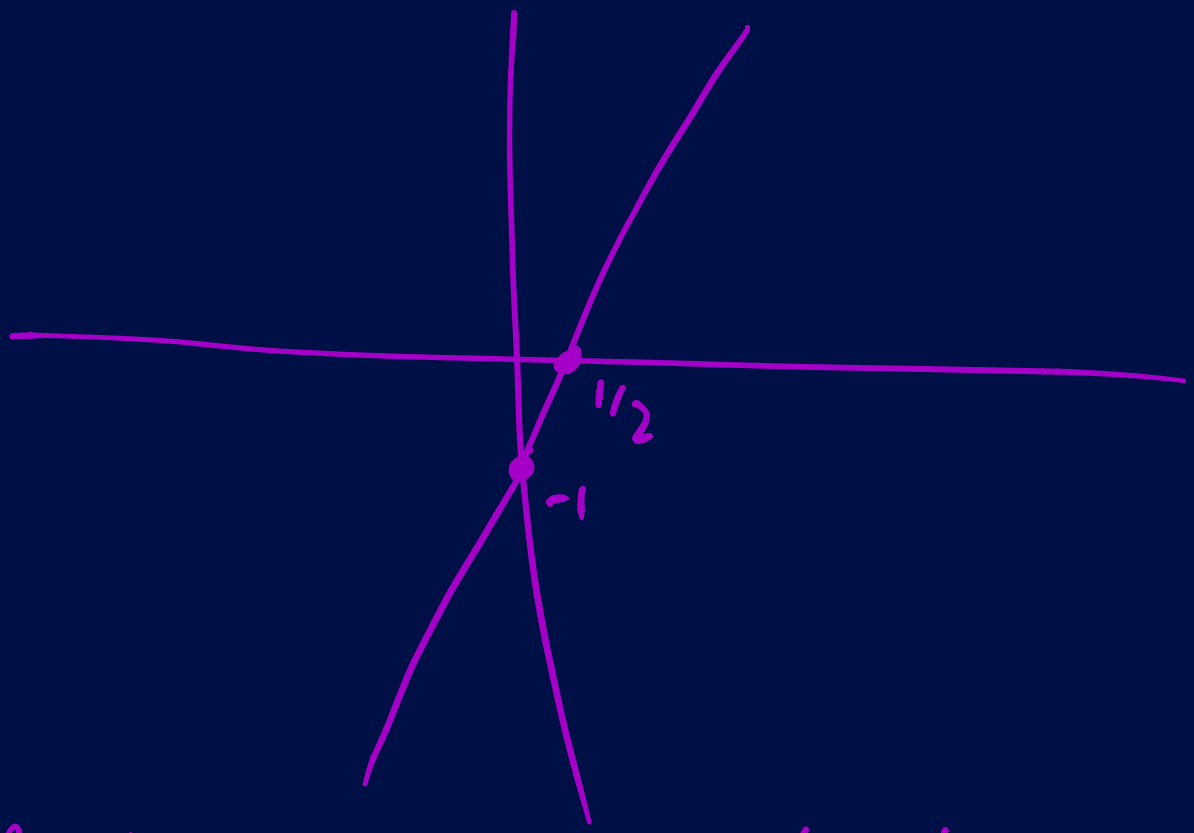
$$\Rightarrow 2y = 4x - 2$$

$$\Rightarrow y = 2x - 1$$

When $x = 0$, $y = -1$

When $y = 0$, $0 = 2x - 1$

$$\Rightarrow x = 1/2$$



⑤ A line passes through the point $(1,1)$ and has gradient -1. Find its equation and intercepts.

$$y = mx + b$$

$m = -1$

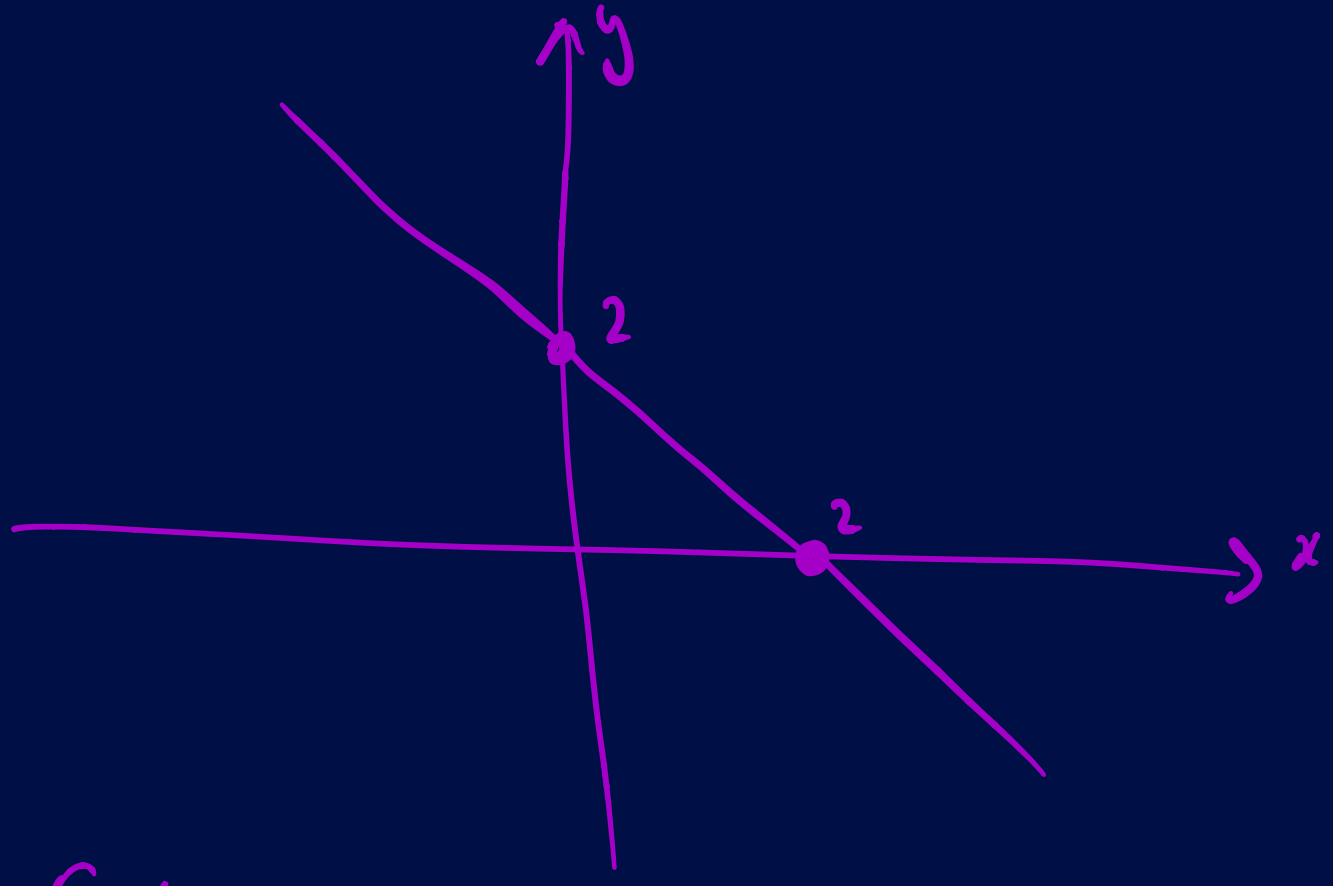
Sub pt into eqn: $1 = -1 + b$

$\Rightarrow b = 2$

So $y = -x + 2$

When $x = 0$, $y = 2$

When $y = 0$, $0 = -x + 2 \Rightarrow x = 2$



⑥ Find the points where the lines $y = 2x + 4$ and $y = -x$ intersect.

We have $2x + 4 = -x$

$$\Rightarrow \quad 3x + 4 = 0$$

$$\Rightarrow \quad 3x = -4$$

$$\Rightarrow \quad x = -\frac{4}{3}$$

So the point of intersection is

$$\left(-\frac{4}{3}, \frac{4}{3}\right)$$

(7) Find the points where the lines

$$y = -\frac{1}{2}x + 1 \quad \text{and} \quad x + 2y - 4 = 0$$

We rearrange the second equation to find that $2y = -x + 4$

$$\Rightarrow y = -\frac{1}{2}x + 2$$

Both lines have the same gradient

∴ parallel ∴ don't meet since different constant

(8) Find the points where the lines

$2x - y = -5$ and $6x - 3y = -15$

meet

Everywhere - they're the same line

(9)